



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/579,178

09/19/2007

Mark A. Greaney

P20103J100

1554

27810

7590

02/11/2009

ExxonMobil Research & Engineering Company

P.O. Box 900

1545 Route 22 East

Annandale, NJ 08801-0900

EXAMINER

ROBINSON, RENEE E

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

02/11/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/579,178	<b>Applicant(s)</b> GREANEY ET AL.	
	<b>Examiner</b> RENEE ROBINSON	<b>Art Unit</b> 1797	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 May 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Regarding claim 15, it is unclear what is meant by the phrase "any means known". It is unclear whether the claim scope would be the same were it not to be present or whether it has some other meaning, including perhaps an invocation of "means or step plus function" claim language, as provided for by 35 USC § 112, sixth paragraph. If the latter, "means for" language is suggested. Moreover, if so, it is unclear whether clear linkage to disclosed means has been provided in the Specification.

### ***Double Patenting***

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29

Art Unit: 1797

USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

5. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

6. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**7. Claims 1-3, 5-10, 13-17, 19 and 28 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2 and 4-12 of copending Application No. 10/580,582 in view of Chellis et al (U.S. Patent 2,984,617).**

8. Regarding claims 1, 7 and 13 of the instant application and claim 1 of the copending application, both claim a process for the hydroprocessing of a hydrocarbon feedstream containing nitrogen contaminants, comprising:

- a) providing a sulfuric acid solution having a sulfuric acid concentration of at least about 75%, based on the sulfuric acid solution;
- b) contacting the feedstream with the sulfuric acid solution under conditions effective at removing at least 60 wt.% of the nitrogen compounds contained in the feedstream, wherein the volumetric treat rate of the sulfuric acid solution is greater than about 0.5 vol.%, based on the feedstream; and
- g) hydroprocessing the hydrocarbon product stream

Art Unit: 1797

9. The differences between the instant application and the copending application are:

- The instant application claims steps c) and f), separating the used sulfuric acid solution and hydrocarbon product streams. However, the copending application claims separating a product stream from the used sulfuric acid solution in dependent claim 8.
- The instant application claims steps d) and e), cascading at least a portion of the first used sulfuric acid solution to a second contacting stage and contacting a second hydrocarbon feedstream containing nitrogen heteroatoms in the second contacting stage with the first used sulfuric acid solution under conditions effective at removing at least about 60 wt. % of the nitrogen heteroatoms contained in the second hydrocarbon feedstream thereby producing a second stage effluent.

10. Chellis discloses a hydroprocessing process for hydrocarbon feedstreams containing nitrogen and sulfur contaminants, comprising sending one hydrocarbon feedstream to a first contact stage where the feedstream is contacted with a sulfuric acid solution and sending another hydrocarbon feedstream to a second contact stage where the second feedstream is contacted with a sulfuric acid solution (column 2, lines 7-11; Fig. 3, sequences 14 and 15).

11. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as claimed in the copending application by removing nitrogen from two hydrocarbon streams in parallel contacting stages, as

Art Unit: 1797

suggested by Chellis. One having ordinary skill in the art would have been motivated to do this in order to effectively remove nitrogen from feedstreams with different compositions. It further would have been obvious to recycle the used sulfuric acid solution from the first contacting stage to the second contacting stage in order to minimize the amount of fresh sulfuric acid required for the process.

12. Claim 2 of the instant application differs from claim 2 of the copending application in that the copending application claims that the feedstream has an initial boiling point of about 315°C, whereas the instant application claims feedstreams boiling above 300°F. However, 315°C (600°F) is above 300°F and therefore encompasses the claimed feedstreams.

13. Regarding claims 3 and 28 of the instant application and claim 1 of the copending application, both claim lube oil boiling range feedstreams.

14. Regarding claim 5 of the instant application and claim 4 of the copending application, the instant application claim a nitrogen-containing feedstream containing a nitrogen content of about 25-2500wppm, whereas the copending application claims a nitrogen content greater than about 100wppm nitrogen. However, this encompasses the claimed range of 25-2500wppm claimed in the instant application.

15. Regarding claim 6 of the instant application and claim 5 of the copending application, the instant application claims that the nitrogen in the feedstock carbazole and/or substituted carbazoles, whereas the copending application claims basic and non-basic heterocyclic nitrogen compounds. However, carbazole is a type of heterocyclic nitrogen compound.

Art Unit: 1797

16. Claim 8 of the instant application and claim 6 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

17. Claim 9 of the instant application and claim 10 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

18. Claim 10 of the instant application and claim 11 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

19. Claim 14 of the instant application and claim 7 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

20. Claim 15 of the instant application and claim 8 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

21. Claim 16 of the instant application and claim 9 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

22. Regarding claim 17 of the instant application and claim 1 of the copending application, both claim hydroprocessing process selected from hydrotreating, hydrocracking, hydrodewaxing, and hydrofinishing.

Art Unit: 1797

23. Regarding claim 19 of the instant application and claim 12 of the copending application, both claim contacting the effluent with an effective amount of an acid reducing material selected from caustic and water under conditions effective at reducing the total acid number of the effluent (product).

24. This is a provisional obviousness-type double patenting rejection.

**25. Claims 1, 2, 5-16, 18 and 19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-9, 11-15, 18-20, 22-29, 31- 33, 35, 36, 38 and 39 of copending Application No. 10/579,176 in view of Chellis et al (U.S. Patent 2,984,617).**

26. Regarding claims 1 and 7 of the instant application and claims 1, 6, 13, 18, 24, 27, 33, 35 and 39 of the copending application, both claim hydroprocessing of a hydrocarbon feedstream containing nitrogen and sulfur contaminants, comprising:

- a) providing a sulfuric acid solution having a sulfuric acid concentration of at least about 75%, based on the sulfuric acid solution;
- b) contacting the feedstream with the sulfuric acid solution under conditions effective at removing at least 60 wt.% of the nitrogen compounds contained in the feedstream, wherein the volumetric treat rate of the sulfuric acid solution is greater than about 0.5 vol.%, based on the feedstream; and
- g) hydroprocessing the hydrocarbon product stream

27. The differences between the instant application and the copending application are:



Art Unit: 1797

- The instant application claims steps c) and f), separating the used sulfuric acid solution and hydrocarbon product streams. However, the copending application claims separating a product stream from the used sulfuric acid solution in independent claim 39 and dependent claims 18 and 35.
- The instant application claims steps d) and e), cascading at least a portion of the first used sulfuric acid solution to a second contacting stage and contacting a second hydrocarbon feedstream containing nitrogen heteroatoms in the second contacting stage with the first used sulfuric acid solution under conditions effective at removing at least about 60 wt. % of the nitrogen heteroatoms contained in the second hydrocarbon feedstream thereby producing a second stage effluent.

28. Chellis discloses a hydroprocessing process for hydrocarbon feedstreams containing nitrogen and sulfur contaminants, comprising sending one hydrocarbon feedstream to a first contact stage where the feedstream is contacted with a sulfuric acid solution and sending another hydrocarbon feedstream to a second contact stage where the second feedstream is contacted with a sulfuric acid solution (column 2, lines 7-11; Fig. 3, sequences 14 and 15).

29. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as claimed in the copending application by removing nitrogen from two hydrocarbon streams in parallel contacting stages, as suggested by Chellis. One having ordinary skill in the art would have been motivated to do this in order to effectively remove nitrogen from feedstreams with different

Art Unit: 1797

compositions. It further would have been obvious to recycle the used sulfuric acid solution from the first contacting stage to the second contacting stage in order to minimize the amount of fresh sulfuric acid required for the process.

30. Claim 2 of the instant application claims feedstreams boiling above about 300°F, whereas claims 2 and 3 of the copending application claim feedstream boiling ranges of about 300-775°F and about 400-700°F, respectively. However, both of these claimed temperature ranges encompass a feedstream boiling above 300°F.

31. Regarding claim 5 of the instant application and claims 4 and 25 of the copending application, the instant application claims a feedstream containing about 25-2500wppm nitrogen, whereas the copending application claims a nitrogen content of about 50-1000wppm and about 75-800wppm, respectively. However, this encompasses the claimed range of about 25-2500wppm claimed in the instant application.

32. Claim 6 of the instant application and claims 5 and 26 of the copending application both claim carbazole and/or substituted carbazoles.

33. Claim 8 of the instant application and claims 7 and 28 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

34. Claim 9 of the instant application and claims 8 and 39 (steps a) and b)) of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

Art Unit: 1797

35. Regarding claim 10 of the instant application and claims 9 and 29 of the copending application, the instant application claims adding a diluent to the sulfuric acid solution to adjust the concentration, whereas the copending application claims adding water to adjust the sulfuric acid concentration. However, water is commonly used in the art as a diluent.

36. Regarding claim 11 of the instant application and claims 11 and 31 of the copending application, both claim a sulfur concentration in the product stream(s) of about 0.1 to about 25 wt. % less than the feedstream(s).

37. Regarding claim 12 of the instant application and claims 12 and 32 of the copending application, both claim a yield loss within the range of about 0.5 to about 6 wt.%.

38. Claim 13 of the instant application and claim 14 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

39. Claim 14 of the instant application and claim 15 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

40. Claim 15 of the instant application and claim 19 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

Art Unit: 1797

41. Claim 16 of the instant application and claim 20 and 36 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

42. Claim 18 of the instant application claims contacting at least a portion of the second hydrocarbon product stream with a hydroprocessing catalyst in a hydroprocessing reaction stage. The copending application claims hydrotreating (hydroprocessing) with hydroprocessing catalysts in claims 22, 24 c), and 39 g).

43. Claim 19 of the instant application and claims 23 and 38 of the copending application are identical except with regards to the differences in the independent claims, as discussed above.

44. This is a provisional obviousness-type double patenting rejection.

### ***Claim Rejections - 35 USC § 103***

45. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

46. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1797

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

47. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**48. Claims 1-8, 10-16, 18-26, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis et al (U.S. Patent 2,984,617) in view of Debande (U.S. Patent 4,392,948).**

49. Regarding claims 1, 7, 13, 15 and 18, Chellis discloses a hydroprocessing process for hydrocarbon feedstreams containing nitrogen and sulfur contaminants (column 2, lines 7-11), comprising:

- a) providing a sulfuric acid solution having a sulfuric acid concentration of at least about 75 wt.% (80-98 wt.%), based on the sulfuric acid solution (column 2, lines 42-47);
- b) contacting a first hydrocarbon feedstream containing nitrogen and sulfur heteroatoms in a first contacting stage with the sulfuric acid solutions

under conditions effective at removing at least about 60 wt.% of the nitrogen heteroatoms contained in the hydrocarbon feedstream thereby producing at least a first stage effluent comprising at least a first hydrocarbon product stream and a first used sulfuric acid solution, wherein the volumetric treat rate of the sulfuric acid solution is within applicant's claimed range (1 to 15 pounds of acid per barrel of naphtha), based on the first hydrocarbon stream (column 2, lines 19-20; column 4, lines 55-65). Chellis does not expressly state that the feedstream has a total acid number; however this is an inherent characteristic of hydrocarbon feedstreams;

- c) separating the first used sulfuric acid solution and the first hydrocarbon product stream (column 4, lines 74-75);
- e) contacting a second hydrocarbon feedstream containing nitrogen heteroatoms in a second contacting stage with sulfuric acid solution under conditions effective at removing at least about 60 wt.% of the nitrogen heteroatoms contained in the second hydrocarbon feedstream, thereby producing at least a second stage effluent comprising at least a second hydrocarbon product stream and a second used sulfuric acid solution wherein the volumetric treat rate of the sulfuric acid is within applicant's claimed range (1 to 15 pounds of acid per barrel of naphtha), based on the second hydrocarbon feedstream, wherein the concentration of the nitrogen heteroatoms in the second hydrocarbon feedstream is higher

than that of the first hydrocarbon feedstream (Fig. 3, sequences 14 and 15). Again, Chellis does not expressly state that the feedstream has a total acid number; however this is an inherent characteristic of hydrocarbon feedstreams;

- f) separating the second used sulfuric acid solution and the second hydrocarbon product stream (column 5, lines 13-14); and
- g) contacting the first and second hydrocarbon product streams with a hydroprocessing (reforming) catalyst in a hydroprocessing (reforming) reaction stage (column 1, lines 15-20).

50. Chellis does not expressly disclose:

- d) cascading at least a portion of the first used sulfuric acid solution to the second contacting stage; and

51. Debande discloses a process for removing nitrogen impurities from a hydrocarbon mixture, comprising treating the hydrocarbon feedstream with a sulfuric acid solution and subsequently separating the used sulfuric acid from the hydrocarbon product (column 1, lines 11-16; column 6, lines 18-19 and 44-46). Debande further discloses that the used sulfuric acid is then recycled to the contacting stage, thereby reducing the acid consumption and avoiding problems associated with the disposal of significant amounts of aqueous acid solutions (column 5, lines 18-21).

52. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as disclosed by Chellis by reusing the sulfuric acid separated from the hydrocarbon stream. One of ordinary skill in the art

Art Unit: 1797

would have been motivated to do this in order to minimize the amount of fresh sulfuric acid required for the process.

53. Regarding claims 2 and 3, Chellis discloses that the hydrocarbon feedstreams are naphtha, which boils in the range of 172-215°C (342-419°F), as evidenced by the material data sheet. Further, the specification of the instant application defines distillate boiling range to be in the range of about 300-700°F (page 7, paragraph 0016), which is encompassed by the Chellis disclosure.

54. Regarding claims 4, 20 and 22, Chellis discloses distillate boiling range feedstreams that are not hydrotreated, are previously hydrotreated, or are blends of non-hydrotreated and previously hydrotreated feedstreams (Fig. 1, sequences 6 and 5). Chellis further discloses that the feedstream may contain cracked stock (column 3, lines 34-35).

55. Regarding claims 5 and 6, Chellis discloses that the hydrocarbon feedstreams contain anywhere from 25 wppm nitrogen to a nitrogen content in excess of 1000 wppm (column 3, lines 35-42). Chellis does not expressly disclose that the nitrogen compounds include carbazole and/or substituted carbazoles. However, carbazole is merely a type of basic nitrogen compound that is commonly found in naphtha, as evidenced by Podrebarac (U.S. Pub. No. 2004/0178123, paragraph 0025).

56. Regarding claim 8, Chellis discloses that the sulfuric acid solution is obtained from an alkylation process unit (column 2, lines 47-48).

57. Regarding claim 10, Chellis does not expressly disclose that a diluent is added to the sulfuric acid solution to adjust the concentration of the solution. However, Chellis



Art Unit: 1797

does disclose a range of sulfuric acid concentrations (80-98 wt %) and therefore, it would be obvious to add a diluent in order to adjust to the acid concentration to the disclosed concentration (column 2, lines 46-47).

58. Regarding claim 11, Chellis does not expressly disclose that the sulfur concentration of the product streams is about 0.1 to about 25 wt. % less than the respective first and second streams. However, Chellis discloses that the load on the hydrodesulfurization unit can be reduced by reducing the nitrogen and sulfur content of a reformer feed by subjecting the feed to the treatments of the invention, such as contact with sulfuric acid (column 1, lines 43-48). Chellis further discloses that the sulfur content is satisfactorily reduced (column 2, lines 10-11). Therefore, it would have been obvious to a person of ordinary skill in the art to reduce the sulfur content by an amount in the claimed range in order to reduce the load on the hydrodesulfurization unit.

59. Regarding claim 12, Chellis discloses that the yield of the hydrocarbon product from acid denitrogenation is 98-99% of the charge volume, corresponding to a yield loss of 1-2 vol. % (column 4, line 62).

60. Regarding claim 14, Chellis discloses contacting the sulfuric acid and hydrocarbon feedstream, but does not expressly disclose that they are contacted by a method selected from non-dispersive and dispersive contacting methods (column 2, lines 42-44). However, it would have been obvious to a person of ordinary skill in the art to use one of these techniques in order to allow for adequate contact of the sulfuric acid and hydrocarbon feedstream.

61. Regarding claim 16, Chellis discloses separating the sulfuric acid solution from the hydrocarbon product streams, but does not expressly disclose that the separation is achieved by a device selected from settling tanks or drums, coalescers, electrostatic precipitators, and other similar devices.

62. Debande discloses separating the used sulfuric acid from the hydrocarbon product in a decanter (a type of settling tank or drum) (column 1, lines 11-16; column 6, lines 18-19 and 44-46).

63. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use decanters in order to effectively separate the sulfuric acid from the hydrocarbon product streams.

64. Regarding claim 19, Chellis discloses parallel stages of acid denitrogenation (see Fig. 3, sequence 14), wherein denitrogenation comprises contact with sulfuric acid followed by neutralization with a mild caustic solution (column 2, lines 42-45). A necessary consequence of neutralizing the hydrocarbon product is a reduction in the Total Acid Number.

65. Regarding claims 21, 23 and 25, Chellis discloses that the sulfuric acid solution has a concentration of about 80-98 wt% sulfuric acid (column 2, lines 46-47). Chellis does not expressly disclose the content of the remainder of the acid solution.

66. Debande discloses that the sulfuric acid solution is aqueous, or in other words, water constitutes the balance of the acid solution (Abstract).

Art Unit: 1797

67. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use water as the balance of the acid solution because it is well known in the art that water is effective in controlling the concentration of acid in a solution.

68. Regarding claims 24-26, Chellis discloses that the second feedstream is thermally cracked stock (Fig. 3, sequences 14 and 15).

69. Regarding claim 30, Chellis discloses a sequence in which the second hydrocarbon feedstream is first treated in a solutizer salt stage and the raffinate from that stage is subsequently fed to the acid treat stage, where the hydrocarbon raffinate is contacted with sulfuric acid (Fig. 3, sequence 15).

70. Regarding claim 31, Chellis discloses using white or spent sulfuric acid from an alkylation process (column 2, lines 47-48), which implies that the aqueous sulfuric acid of 80-98 wt.% has a hydrocarbon content in the acid solution.

**71. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis et al (U.S. Patent 2,984,617) in view of Debande (U.S. Patent 4,392,948) and in further view of Parvinen et al (U.S. Patent 6,007,722).**

72. Chellis in view of Debande is relied upon as set forth above in the rejection of claims 1 and 8.

73. Regarding claim 9, Chellis in view of Debande does not expressly disclose that the alkylation process comprises:

- a) Combining and olefinic hydrocarbon feedstream containing C<sub>4</sub> olefins with isobutane to form a hydrocarbonaceous mixture; and

Art Unit: 1797

- b) Contacting the hydrocarbonaceous mixture with sulfuric acid under conditions effective for producing at least an alkylate and a sulfuric acid solution having an acid concentration of at least about 75 wt. %.

74. Parvinen discloses a process for recycling and reusing spent sulfuric acid obtained from an alkylation process (column 1, lines 60-64; column 2, lines 23-25). The alkylation process comprises:

- a) Combining an olefinic hydrocarbon feedstream containing C<sub>4</sub> olefins (butene) with isobutane to form a hydrocarbonaceous mixture; and
- b) Contacting the hydrocarbonaceous mixture with sulfuric acid under conditions effective for producing at least an alkylate and a sulfuric acid solution having an acid concentration of at least about 75 wt. % (85-88%) (column 1, lines 57-64; column 2, lines 5-7).

75. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as disclosed by Chellis in view of Debande by obtaining the sulfuric acid from an alkylation process as described by Parvinen.

76. One having ordinary skill in the art would have been motivated to do this in order to produce alkylates and efficiently use sulfuric acid for multiple processes.

**77. Claims 17 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis et al (U.S. Patent 2,984,617) in view of Debande (U.S. Patent 4,392,948) and in further view of Hans (U.S. Patent 3,575,844).**

78. Chellis in view of Debande is relied upon as set forth above in the rejection of claims 1 and 26.

Art Unit: 1797

79. Regarding claim 17, Chellis discloses hydroprocessing (reforming) the acid treated hydrocarbon products, but does not expressly disclose that the process is selected from hydrotreating, hydrocracking, ring opening, aromatics saturation, hydrodewaxing, and hydrofinishing.

80. Hans discloses a process for removing nitrogen contaminants from a hydrocarbon oil comprising treating the hydrocarbon feed with acid and subsequently hydrocracking the hydrocarbon oil (column 1, lines 33-38; column 2, lines 53-55). Hans further discloses that the process of acid treating and hydrocracking the hydrocarbon oil is useful in producing light gases, gasoline, distillate fuel and lubricating oils (column 1, lines 31-34).

81. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as disclosed by Chellis in view of Debande by hydrocracking the acid treated hydrocarbon products in order to produce higher quality products, such as lubricating oils and distillate fuels.

82. Regarding claim 27, Chellis in view of Debande does not expressly disclose an acid treat rate of about 3 vol. % to about 6 vol. % based on the distillate boiling range feedstream.

83. Hans discloses that the amount of acid which is used should be sufficient to enable good contact between the aqueous acid phase and the oil phase, wherein a suitable acid treat is more than 1%, with good results being obtained with 8% (column 3, lines 36-43).

Art Unit: 1797

84. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as disclosed by Chellis in view of Debande by contacting the hydrocarbon feedstock in the distillate boiling range with sulfuric acid by using an acid treat rate within the claimed range in order to achieve good contact between the acid and the hydrocarbons.

**85. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis et al (U.S. Patent 2,984,617) in view of Debande (U.S. Patent 4,392,948) and in further view of Skomoroski et al (U.S. Patent 3,123,550).**

86. Chellis in view of Debande is relied upon as set forth above in the rejection of claim 1.

87. Regarding claim 28, Chellis in view of Debande does not expressly disclose hydrocarbon feedstreams in the lube oil boiling range.

88. Skomoroski discloses treating hydrocarbon feedstocks, such as distillates in the lubricating oil boiling range with acid (column 2, lines 39-40). The result is effective in removing nitrogen contaminants (column 1, lines 10-16).

89. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process as disclosed by Chellis in view of Debande by acid treating hydrocarbon feedstocks in the lube oil boiling range in order to remove nitrogen contaminants from hydrocarbon feedstocks boiling in this range.

90. Regarding claim 29, Chellis discloses using white or spent sulfuric acid from an alkylation process (column 2, lines 47-48), which implies that the aqueous sulfuric acid of 80-98 wt.% has contaminants of hydrocarbons in the acid solution.

***Conclusion***

91. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RENEE ROBINSON whose telephone number is (571)270-7371. The examiner can normally be reached on Monday through Thursday 7:30-5:00.

92. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on (571)272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

93. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. R./  
Examiner, Art Unit 1797  
4 February 2009

/Walter D. Griffin/  
Supervisory Patent Examiner, Art  
Unit 1797